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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/658,906	09/10/2003	Thomas Jan Kulp	02TM-104835	3601
40280	7590	07/13/2005	EXAMINER	
STEVEN VOSEN 1563 SOLANO AVENUE #206 BERKELEY, CA 94707			NGUYEN, DUNG T	
			ART UNIT	PAPER NUMBER
			2828	

DATE MAILED: 07/13/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

AK

**Office Action Summary**

Application No.

10/658,906

Applicant(s)

KULP ET AL.

Examiner

Dung (Michael) T. Nguyen

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-92 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 1-16 and 47-62 is/are allowed.
- 6) ☒ Claim(s) 17-32, 34-46, 63-78 and 80-92 is/are rejected.
- 7) ☒ Claim(s) 33 and 79 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                    |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)</p> <p>2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)</p> <p>3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br/>Paper No(s)/Mail Date <u>10/20/03</u>.</p> | <p>4) <input type="checkbox"/> Interview Summary (PTO-413)<br/>Paper No(s)/Mail Date. ____.</p> <p>5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)</p> <p>6) <input type="checkbox"/> Other: ____.</p> |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

## DETAILED ACTION

### *Claim Rejections - 35 USC § 103*

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 17-18, 21-22, 24-28, 31-32, 34-35, 38-42, 45, 63-64, 67-68, 70-74, 77-78, 80-81, 84-88, and 91 are rejected under 35 U.S.C. 103(a) as being unpatentable over Goers et al. (Development of a compact gas imaging sensor employing a cw fiber-amp pumped PPLN OPO technical paper during CLEO 2001 sent in by IDS on 10/20/03) in view of Demos et al. (US20040006276).

With respect to claims 17-18, 24-26, 28, 34-35, 40-41, 63-64, 70-72, 74, 80-81, and 86-87, Goers show in Fig. 1 a backscatter absorption gas imaging system for imaging a gas between the system and a scene, comprising: an optical fiber amplifier, having a gain medium and at least one pump laser diode, to accept light from the light-generating device and produce amplified light, wherein said optical fiber amplifier is a Yb-doped, tapered optical fiber amplifier, and a nonlinear frequency converter including an optical parametric oscillator (OPO) to accept said amplified light and generate an output of the light source at wavelengths shifted from and corresponding to each of said more than one wavelength; and a camera responsive to backscattered illumination by said light source (page 1, para. 5, l. 1).

Goers lack a light source to generate an output for illuminating said scene, including two or more light-generating devices each producing continuous-wave light at more than one wavelength and a switch to select light from one of said two or more light-generating devices.

Demos teach in Fig.6A two or more light-generating devices 120-130 each producing continuous-wave light (para.0061, 1.8) at more than one wavelength (monochromatic) (para.0061, 1.7) (by the definition in the Merriam-Webster's dictionary, monochromatic means consisting of radiation of a very small range of wavelengths) and a switch 134 to select light from one of said two or more light-generating devices.

For the motivation of seeding the fiber amplifier to pump the OPO module with light generating devices, it would have been obvious to one having ordinary skill in the art at the time the invention was made to provide Goers what is taught by Demos.

With respect to claims 21, 38, 67, and 84, Goers show in Fig.1 a Nd:YAG laser..

With respect to claims 27, 42, 73, and 88, Goers disclose the pump laser with an output of near 915nm (page 1, para. 4, 1.2).

With respect to claims 31, 45, 77, and 91, Goers show in Fig.1 the OPO, having accepted said amplified light, generates a signal beam and an idler beam, further including optics to provide said idler beam as said adjustable wavelength output.

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With respect to claims 32 and 78, it is inherent that at least one pump laser is an air-cooled pump laser having an operating temperature at an ambient temperature. Otherwise, the pump laser will be degraded during performance with high temperature.

With respect to claims 22, 39, 68, and 85, Demos disclose the light generating device is a laser diode. For the motivation of having the light generating device interchangeable (para.006, 18-9), it would have been obvious to one having ordinary skill in the art at the time the invention was made to provide Goers what is taught by Demos.

Claims 19, 36, 65, and 82 are rejected under 35 U.S.C. 103(a) as being unpatentable over Goers et al. (Development of a compact gas imaging sensor employing a cw fiber-amp pumped PPLN OPO technical paper during CLEO 2001 sent in by IDS on 10/20/03) in view of Demos et al. (US20040006276) and further in view of Karakawa (US6304237).

Goers et al. (Development of a compact gas imaging sensor employing a cw fiber-amp pumped PPLN OPO technical paper during CLEO 2001 sent in by IDS on 10/20/03) in view of Demos et al. (US20040006276) disclose all limitations of the claims except for the light-generating device produces quasi-continuous-wave light, where said quasi-continuous-wave light has a repetition rate greater than about 10 kHz.

Karakawa teach in col.2, l.43-52 the light-generating device produces quasi-continuous-wave light, where said quasi-continuous-wave light has a repetition rate greater than about 10 kHz.

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For the motivation of producing very optical short pulses and operating at high pulse repetition rate (col.2, l.43-45), it would have been obvious to one having ordinary skill in the art at the time the invention was made to provide Goers and Demos what is taught by Karakawa.

Claims 20, 23, 37, 66, 69, and 83 are rejected under 35 U.S.C. 103(a) as being unpatentable over Goers et al. (Development of a compact gas imaging sensor employing a cw fiber-amp pumped PPLN OPO technical paper during CLEO 2001 sent in by IDS on 10/20/03) in view of Demos et al. (US20040006276) and further in view of Nishi (US2003/0081192).

With respect to claims 23 and 69, Goers and Demos disclose all limitations of the claims except for the fiber laser.

Nishi teaches the fiber laser (para.0019, l.5).

For the motivation of having the seed lasers interchangeable (para.0019), it would have been obvious to one having ordinary skill in the art at the time the invention was made to provide Goers and Demos what is taught by Nishi

With respect to claims 20, 37, 66, and 83, Nishi discloses the multi-mode laser (para.0088, l.12-13).

Claims 29-30, 43-44, 75-76, and 89-90 are rejected under 35 U.S.C. 103(a) as being unpatentable over Goers et al. (Development of a compact gas imaging sensor employing a cw

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fiber-amp pumped PPLN OPO technical paper during CLEO 2001 sent in by IDS on 10/20/03) in view of Demos et al. (US20040006276) and further in view of Richter (US6751010).

Goers and Demos disclose all limitations of the claims except for the singly and doubly resonant OPOs.

Richter teaches the singly and doubly resonant OPOs (col.1, 1.39-50).

For the motivation of converting a small fraction of the pump beam into the signal and idler beams (col.1, 1.36-39), it would have been obvious to one having ordinary skill in the art at the time the invention was made to provide Goers and Demos what is taught by Richter.

Claims 46 and 92 are rejected under 35 U.S.C. 103(a) as being unpatentable over Goers et al. (Development of a compact gas imaging sensor employing a cw fiber-amp pumped PPLN OPO technical paper during CLEO 2001 sent in by IDS on 10/20/03) in view of Galvanauskas et al. (US2004/0036957).

Goers disclose in Fig.1 a diode-pumped fiber laser producing an output of light at more than one wavelength, where said diode-pumped fiber laser is an air-cooled laser (it is understood that the fiber laser must always be maintained in a cool environment in order to work properly), and where said output varies with temperature, and a nonlinear frequency converter including an optical parametric oscillator (OPO) to accept said output and generate an output of the light source at wavelengths shifted from and corresponding to each of said more than one wavelength; and a camera responsive to backscattered illumination by said light source (page 1, para.5, 1.1).

Goers lack the diode-pumped fiber laser provides an output that varies by no more than 10% over an ambient temperature range of from about 0 C to about 40 C (room temperature).

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Galvanauskas teach the diode-pumped fiber laser provides an output of 90% (para.0010) (that is the fiber laser output varies by no more than 10% over room temperature).

For the motivation of cost savings between the solid state laser and the fiber laser (para.0010), it would have been obvious to one having ordinary skill in the art at the time the invention was made to provide Goers what is taught by Galvanauskas.

*Allowable Subject Matter*

Claims 33 and 79 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claims 1-16 and 47-62 are allowed.

The following is a statement of reasons for the indication of allowable subject matter:

Claims 1 and 47 are allowed over the Goers, Demos, and Nishi, Karakawa, and Richter prior art because they fail to teach the limitations of the absorption of the output of the pump laser by the gain medium varies by no more than about 10% over a range of ambient temperatures of from about 0 C to about 40 C.

Claims 2-16 and 48-62 are found allowable due to their dependency on claims 1 and 47.



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### Communication Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dung (Michael) T Nguyen whose telephone number is (571) 272-1949. The examiner can normally be reached on 8:30 - 17:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Min Harvey can be reached on (571) 272-1835. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 306-3329.

Michael Dung Nguyen

*Arnold P.*  
Examiner  
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